CLAIMS:

What is claimed is:

1. A method for coding a multi-code code division multiple access signal based on Go-CDMA codes, comprising:

5   providing a Go-CDMA matrix;

coding a multi-code data message based on the Go-CDMA matrix; and

transmitting the coded data message over a communication channel.

2. The method according to claim 1, wherein the coding includes multiplying the data by the

10   Go-CDMA matrix.

3. A method for coding a multi-code code division multiple access signal based on Go-CDMA codes, comprising:

providing a multi-code coding block for coding based on a Hadamard code;

15   replacing the Hadamard code with a Go-CDMA code;

coding a data message using the multi-code coding block based on the Go-CDMA code;

and

transmitting the coded data message over a communication channel.

20   4. A method for decoding a multi-code code division multiple access signal based on Go-CDMA codes, comprising:

providing a Go-CDMA matrix;

receiving a coded multi-code data message over a communication channel; and

decoding the data message based on the Go-CDMA matrix.

5. The method according to claim 4, wherein the decoding includes correlating the data

5   message with the Go-CDMA matrix.

6. A method for decoding a multi-code code division multiple access signal based on Go-

CDMA codes, comprising:

       providing a multi-code decoding block for decoding based on a Hadamard code;

10   replacing the Hadamard code with a Go-CDMA code;

       receiving the coded data message over a communication channel; and

       decoding the data message using the multi-code coding block based on the Go-CDMA

code.

15   7. A computer program product for causing a system to provide a multi-code code division

       multiple access signal, the computer program product comprising a computer useable

       medium having computer program logic therein, the computer program logic comprising:

       providing means for causing the system to provide a Go-CDMA matrix;

       coding means for causing the system to code a multi-code data message based on the Go-

20   CDMA matrix; and

       transmitting means for causing the system to transmit the coded data message over a

communication channel.

8. The computer program product according to claim 7, wherein the coding means includes means for multiplying the data message by the Go-CDMA matrix.

9. A computer program product for causing a system to provide a multi-code code division

5 multiple access signal, the computer program product comprising a computer useable

medium having computer program logic therein, the computer program logic comprising:

providing means for causing the system to provide a multi-code coding block for coding

based on a Hadamard code;

replacing means for causing the system to replace the Hadamard code with a Go-CDMA

10 code;

coding means for causing the system to code a data message using the multi-code coding

block based on the Go-CDMA code; and

transmitting means for causing the system to transmit the coded data message over a

communication channel.

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10. A computer program product for causing a system to decode a multi-code code division

multiple access signal, the computer program product comprising a computer useable

medium having computer program logic therein, the computer program logic comprising:

providing means for causing the system to provide a Go-CDMA matrix;

20 receiving means for causing the system to receive a coded multi-code data message over

a communication channel; and

decoding means for causing the system to decode the data message based on the Go-

CDMA matrix.

11. The computer program product according to claim 7, wherein the decoding means includes means for correlating the data message by the Go-CDMA matrix.

5   12. A computer program product for causing a system to decode a multi-code code division multiple access signal, the computer program product comprising a computer useable medium having computer program logic therein, the computer program logic comprising:

providing means for causing the system to provide a multi-code decoding block for decoding based on a Hadamard code;

10   replacing means for causing the system to replace the Hadamard code with a Go-CDMA code;

receiving means for causing the system to receive the coded multi-code data message over a communication channel; and

decoding means for causing the system to decode the data message using the multi-code

15   coding block based on the Go-CDMA code.

13. A system for providing a multi-code code division multiple access signal, comprising:

a memory including program instructions, data corresponding to at least one data stream and Go-CDMA codes;

20   a modulation unit for modulating a signal; and

a processor coupled to the memory and the modulation unit, the processor executing the program instructions to a) code at least one multi-code data message stream based on Go-CDMA

codes and b) cause the modulation unit to modulate the at least one coded message stream for

transmission over a communication channel.

14. The system according to claim 13, wherein the processor codes the at least one multi-code

5   data message stream by multiplying a data message stream by the Go-CDMA codes.

15. The system according to claim 13, wherein the system is part of a mobile communication

unit.

10   16. The system method according to claim 13, wherein the system is a base station.

17. The system according to claim 16, wherein coding is performed on more than two multi-code

data message streams and wherein some of the multi-code data message streams are

associated with a different mobile unit than others of the multi-code data message streams.

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18. A system for providing a multi-code code division multiple access signal, comprising:

a memory including program instructions, data corresponding to at least one data stream

and Go-CDMA codes;

a modulation unit for modulating a signal; and

20   a processor coupled to the memory and the modulation unit, the processor executing the

program instructions to a) provide a multi-code coding block for coding based on a Hadamard

code, b) replace the Hadamard code with a Go-CDMA code, c) code a data message using the

multi-code coding block based on the Go-CDMA code, and d) cause the modulation unit to

modulate the coded message stream for transmission over a communication channel.

19. A system for decoding a multi-code code division multiple access signal, comprising:

5   a memory including program instructions and Go-CDMA codes;

a demodulation unit for demodulating a signal; and

a processor coupled to the memory and the demodulation unit, the processor executing

the program instructions to a) cause the modulation unit to demodulate the signal for receiving

the multi-code data message stream, and b) decode the multi-code data message stream based on

10   Go-CDMA codes.

20. The system according to claim 19, wherein the system decodes the multi-code data message

by correlating the data message stream by the Go-CDMA codes.

15   21. A system for decoding a multi-code code division multiple access signal, comprising:

a memory including program instructions and Go-CDMA codes;

a demodulation unit for demodulating a signal; and

a processor coupled to the memory and the demodulation unit, the processor executing

the program instructions to a) provide a multi-code decoding block for decoding based on a

20   Hadamard code, b) replace the Hadamard code with a Go-CDMA code, c) cause the

demodulation unit to demodulate the signal to receive a multi-code data message from the

communication channel, and d) decode the data message using the multi-code decoding block

based on the Go-CDMA codes.

22. A method for decoding a code division multiple access signal based on Go-CDMA codes,

comprising:

receiving a signal over a communication channel;

providing one or more stages of soft decision decoding blocks, each block decoding

5   based on a Go-CDMA matrix; and

decoding data messages from the signal based on the blocks.

23. The method according to claim 22, wherein one or more stages of soft decision decoding

blocks are provided.

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24. The method according to claim 23, wherein the single soft decision block is a multi-code

decoding block.

25. The method according to claim 22, further comprising a hard decision decoding block

15   coupled as the last stage to the one or more stages of soft decision decoding blocks.

26. A computer program product for causing a system to decode a code division multiple access

signal, the computer program product comprising a computer useable medium having

computer program logic therein, the computer program logic comprising:

20   providing means for causing the system to provide one or more stages of soft decision

decoding blocks, each block decoding based on a Go-CDMA matrix;

receiving means for causing the system to receive a signal over a communication

channel; and

decoding means for causing the system to decode data messages from the signal based on the blocks.

27. The computer program product according to claim 26, wherein the providing means provides
5   one or more stages of soft decision decoding blocks.

28. The computer program product according to claim 27, wherein the soft decision decoding blocks are multi-code decoding blocks.

10 29. The computer program product according to claim 26, further comprising providing means for providing a hard decision decoding block coupled as the last stage to the one or more stages of soft decision decoding blocks.

30. A system for decoding a code division multiple access signal, comprising:

    a memory including program instructions and Go-CDMA codes;

15   a demodulation unit for demodulating a signal; and

    a processor coupled to the memory and the demodulation unit, the processor executing the program instructions to a) cause the demodulation unit to demodulate the signal for receiving a data message stream, and b) provide one or more stages of soft decision decoding blocks, each

20 block decoding based on a Go-CDMA matrix, and c) decode the data message stream based on the blocks.

31. The system according to claim 30, wherein one or more stages of soft decision decoding

blocks are provided.

32. The system according to claim 31, wherein the soft decision decoding blocks are multi-code

5 decoding blocks.

33. The system according to claim 30, further wherein the processor further executes the

program instructions to provide a hard decision decoding block coupled as the last stage to the

one or more stages of soft decision decoding blocks.

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